statics." Also of the following papers :—"Astatic Equilibrium of any System of Forces, treated by Quaternions" (*Proc. Lond. Math. Soc.*) ; "The Absolute Sine Electrometer" (*Nature, Electrical Review*, &c.) ; "Researches in Photo-electricity" (*Proc. Phys. Soc.* and *Phil. Mag.*) ; "Impulsion Cells" (*Electrician, Proc. Phys. Soc.*) ; "Seleno-Aluminium Cells and the Electromotive Forces of Starlight" (*Astronomy and Astro-Physics*) ; "The Magnetic Field of a Circular Current" ; "The Magnetic Field close to the Surface of a Wire carrying a Current" (*Phil. Mag., Proc. Phys. Soc.*).

**WILLIAM HENRY POWER,**

Assistant Medical Officer, H.M. Local Government Board. Author of Reports to the Local Government Board relating to the natural history of epidemic diseases and materially extending the knowledge thereof, more especially (*a*) Demonstration in 1882 of the existence of Scarlatinal Disease in Cows, explaining the previously obscure spread of Scarlatina in human communities by means of Cow's Milk ; (*b*) Record of Cases (afterwards followed by Dr. Klein) where Diphtheria had been spread by the consumption of Cow's Milk ; (*c*) Discovery, in 1881, of the ability of Smallpox to extend atmospherically (without other personal relation) from a hospital to houses in its neighbourhood. The subject was investigated by a Royal Commission which recognised the facts ; they have been subjected to further demonstration by Mr. Power during subsequent years.

**THOMAS PURDIE,**

B.Sc., Ph.D., A.R.S.M., Professor of Chemistry in the University of St. Andrews. Author of the following :—"On the Synthesis of α Isoheptane" ; and "On the Action of Sodium Alcoholates on Fumaric Ethers" (*Trans. Chem. Soc.*, 1881) ; "Action of Sodium Alkyl Oxides on Ethereal Fumarates" (*ibid.*, 1885) ; "The Action of Metallic Alkylates on Mixtures of Ethereal Salts with Alcohols" (*ibid.*, 1887). Joint author with W. Marshall, B.Sc., of :—"Action of Alcohols on Ethereal Salts in presence of Small Quantities of Sodic Alkylates" (*Trans. Chem. Soc.*, 1888) ; "The Addition of the Elements of Alcohol to the Ethereal Salts of Unsaturated Acids" (*ibid.*, 1891). Joint author with J. Wallace Walker, M.A., of :—"Resolution of Lactic Acid into its Optically Active Components" (*ibid.*, 1892) ; "Optically Active Ethoxysuccinic Acid" (*ibid.*, 1893).

## *APRIL METEORS.*

COMPARATIVELY few meteors of the April shower appear to have been seen this year in consequence of the cloudy weather which prevailed. But if the results are scanty they are interesting, for three fine meteors were observed at more than one station, and their real paths in the atmosphere have been computed.

On April 14, 11h. 44m., a bright first mag. meteor was seen by Prof. A. S. Herschel at Slough, and by the writer at Bristol. It moved rapidly in a rather long path, and left a bright streak. The radiant point is indicated at 316° + 31° near ζ Cygni, and the meteor fell from 87 to 71 miles over the English Channel. During its visible career it traversed a course of 107 miles with a velocity of about 49 miles per second. The radiant of this meteor near ζ Cygni is almost identical with that (314° + 27°) found for a 1–2 mag. meteor observed on April 20, 1893, also by Prof. Herschel and the writer.

On April 19, 10h. 59m., a fine meteor, variously estimated as = 1st mag., 2 × ♃, = ♀, = 1st mag., was observed by Mr. Corder at Bridgwater, Mr. Blakeley, Dewsbury, Mr. Packer, Birmingham, and the writer at Bristol, respectively. Its motion was moderately slow, and it left a streak. The direction of its flight shows it to have been a Lyrid with a radiant at 269° + 30°. The meteor descended from 91 to 43 miles over the North Sea and Lincolnshire, and traversed a path of 97 miles with a velocity of 33 miles per second. This object appeared much brighter to the observers at Birmingham and Dewsbury than to those at Bridgwater and Bristol, for the meteor was far more distant from the latter places, and its light much veiled in the mist lying over the stars of Cygnus near the north-east horizon.

On April 19, 11h. 46m., another conspicuous meteor, moving very swiftly, and leaving a bright streak, was seen in Hercules and Boötes by Mr. Corder at Bridgwater, and the writer at Bristol. Its radiant was in Sagitta at 300° + 20°. The meteor fell from 77 to 71 miles over Wiltshire and Somerset, and travelled along a path of 40 miles in less than one second of time. The radiant in Sagitta furnishes a well-defined meteor shower at the April epoch, and I first detected it in 1877. My positions for the radiant are as follow :

| | | | | | |
|---|---|---|---|---|---|
| D, 92 | ... | 1877, April 16–19 | ... | 298° + 25° | 6 meteors |
| D, 110 | ... | 1885, April 18-20 | ... | 299 + 24 | 5 ,, |
| D, 121 | ... | 1887, April 19-25 | ... | 302 + 23 | 4 ,, |

The mean position is at 300° + 24°. Mr. Corder saw a shower in April–May 1876–9 from 300° + 20° (7 meteors), which presents an excellent accordance. The meteors of this stream are very swift, and commonly germinate streaks; but the shower is not well displayed until the morning hours, the radiant being very low before midnight.

W. F. DENNING.

## *NOTES.*

THE following fifteen candidates were selected on Thursday last by the Council of the Royal Society, to be recommended for election into the Society :—Mr. J. Wolfe Barry, Prof. A. G. Bourne, Mr. G. H. Bryan, Mr. J. Eliot, Prof. J. R. Green, Mr. E. H. Griffiths, Mr. C. T. Heycock, Prof. S. J. Hickson, Major H. C. L. Holden, Mr. F. McClean, Prof. W. MacEwen, Dr. S. Martin, Prof. G. M. Minchin, Mr. W. H. Power, Prof. T. Purdie. We give the qualifications of the candidates in another part of this number.

THE memorial of the late Prof. J. C. Adams, at Westminster Abbey, will be unveiled this afternoon by the Duke of Devonshire.

WE are glad to be able to report that Prof. Huxley has been steadily improving in health during the past few days.

DR. P. DANGEARD has been appointed Professor of Botany to the Faculty of Sciences at Poitiers.

AT a meeting of the Court of the Spectacle Makers' Company, on Thursday last, Mr. W. H. M. Christie, the Astronomer Royal, was presented with the honorary freedom of the Company, in recognition of his services to astronomical science.

THE De Candolle prizes have been awarded by the Physical and Natural Histor Society of Geneva to Dr. O. Warburg for his monograph of the *Myristicaceæ*, and to Dr. R. von Wettstein for his monograph of the genus *Euphrasia*.

DURING the past week, the deaths of several eminent men of science have occurred. Surgeon-Major Carter, who was elected a Fellow of the Royal Society in 1859, and obtained the Royal Medal in 1872, died on Saturday last, the 4th inst., at his residence in Budleigh Salterton. We notice also the death of Mr. A. E. Durham, late Vice-President of the Royal College of Surgeons of England, and the author of numerous works on subjects connected with medicine and surgery. Among the announcements of deaths abroad, we regret to see the name of Prof. K. Ludwig, Professor of Physiology in the University of Leipzig, and Director of the Physiological Institute there. He was seventy-eight years of age. The death is also announced of Prof. Manuel Pinheiro Chagas, General Secretary of the Royal Academy of Sciences at Lisbon. Prof. Chagas was born November 13, 1842.

DR. KARL VOGT, the eminent biologist, died at Geneva on Monday, at seventy-eight years of age. He was born at Giessen, and studied under Liebig and Agassiz. After residing for a time in Paris, he returned to Germany, in 1847, as Professor of Zoology in the University of his native town, but soon lost his chair for political reasons. In 1852 he became Professor of Geology at Geneva, and from that time identified himself with the civic life of the country of his adoption.

WE regret to notice that Sir George Buchanan, formerly medical officer to the Local Government Board, died on Sunday last, at the age of sixty-four. As mentioned in these columns last week, he was chairman of the Royal Commission on Tuberculosis, the report of which has just been published. His contributions to the literature of preventive medicine, hygiene, and sanitation are numerous and of prime importance. He was elected a Fellow of the Royal Society in 1882.

ON Monday, May 20, a meeting will be held at the Royal Geographical Society to commemorate the fiftieth anniversary of the sailing of the Arctic Expedition, under Sir John Franklin. The Society's anniversary meeting and the annual conversazione will be held on the following Monday, May 27.

THE Earl of Selborne, whose death occurred on Saturday last, was elected a Fellow of the Royal Society in 1860. He was raised to the peerage as Baron Selborne in 1872. The little Hampshire village, from which the title was derived, is that which is immortalised by Gilbert White's "Natural History."

THE Department of Science and Art has received, through the Foreign Office, a programme of an Exhibition of Medicinal and Useful Plants, which is to be held at the Hague in July next. Intending exhibitors may obtain further information from Dr. M. J. Greshoff, 97 Laan van Meerdervoort, at the Hague.

SIXTY-SIX natives, and as many as 252 animals, have been brought over from Somaliland by Herr Menges, for the East African Village at Sydenham. Among the animals was a "Waller" antelope, and numerous lions, cheetahs, hyenas, jackals, baboons, and ostriches. A further instalment of twenty lions, eleven elephants, four zebras, nineteen ostriches, six leopards, four pythons, and other animals will shortly arrive.

AN International Health Exhibition is to be opened in Paris in a few days, and is to remain open until September 15 next. The exhibits are divided into ten groups, as follow :—(1) Hygiene of the house; (2) the health of towns; (3) treatment of infectious diseases; (4) demography and sanitary statistics; (5) sanitary science; (6) hygiene of infancy; (7) industrial and professional hygiene; (8) food products; (9) the hygiene of clothing—laundry work, sanitary clothing, &c.; (10) physical exercise.

A COURSE of lectures on "Our Edible Sea Fish and the Sea Fisheries," to be delivered by Prof. W. A. Herdman, F.R.S., at University College, Liverpool, has been arranged by the Lancashire Sea Fisheries Joint Committee. The object of the lectures is to interest and inform the general public in a matter of national importance, viz. the present position and future prospects of our fisheries, the need of protection and regulation, and the benefits which may be expected to result from such operations, and from fish-hatching and shell-fish culture.

THE library of the Marine Biological Association's laboratory at Plymouth is in want of a number of volumes to complete sets of those books which form an essential part of the equipment of an institution where scientific investigation is carried on. Among the volumes badly needed are : *Philosophical Transactions* previous to 1878, and the *Proceedings* of the Royal Society previous to 1888. Fellows of the Royal Society, who do not wish to keep their old *Transactions* and *Proceedings*, or the families of Fellows who are dead, could not bestow those volumes more worthily than by giving them to the Plymouth Laboratory. Other volumes which would be welcomed are : *Proceedings* of the Zoological Society previous to 1891, and the *Zeitschrift für Wissensch Zoologie* previous to 1875. Any special monographs on biological subjects, or separate copies of papers, would also be gladly received. Every man of science knows that the literature of a subject should be easy accessible to an investigator, and will therefore recognise the necessity of making the library at Plymouth less deficient in works of reference than it is at present.

WE gave last week a list of the new officers of the U.S. National Academy of Sciences, elected at the recent annual meeting. The new members elected at the same meeting were—Dr. William H. Welch of Johns Hopkins University, Dr. William L. Elkin of Yale University, Prof. Charles S. Sargent of Harvard University, and Prof. Charles Whitman of Chicago University. Three foreign associates were chosen—Prof. Rudolph Leuckart of the University of Leipzig, Prof. Julius von Sachs of Wurzburg, and Prof. Sophus Lie, of Leipzig. The Barnard gold medal was voted to Lord Rayleigh for the discovery of argon. The Watson medal and a purse of 100 dollars was presented to Prof. L. C. Chandler for his researches on the variation of latitude and on the variable stars. An account of this award was given in NATURE a year ago (vol. 50, p. 157). A list of the papers read at the meeting will be found among our Reports of Societies. The Academy selected Philadelphia as the place for the autumn meeting, and fixed the date at October 29. At that meeting the new president, Prof. Wolcott Gibbs, will be inducted into office, and Prof. O. C. Marsh's term of office will terminate.

A NEW era of cheap telephoning seems to have followed the expiration of certain patents and the judicial annulment of others in the United States a few months ago. Simultaneous announcements of reduced rates in Connecticut and Illinois coincide with the formation of a new company—the Standard Telephone Company—with ramifications or sub-companies extending all over the United States, and an aggregate capital of 160,000,000 dollars. Preliminary arrangements were very quietly made, but this company now comes forward with rates of 3 dollars a month, instead of many times that amount now charged, in some cases running as high as 240 dollars a year. Efforts have been made, to induce the legislature of the State of New York, to secure a compulsory reduction of rates; but the old companies have opposed such legislation strenuously, on the ground that no cheaper service could be given. The Standard Company, however, claim to have discovered a new principle or method of operating in electricity, which will enable them to converse over unprecedented distances—say from New York to Denver, or even San Francisco—at very moderate cost. The reticence maintained, however, makes it impossible to decide whether or not these extravagant claims are well-grounded.

AT the second International Zoological Congress held in Moscow in 1892, a resolution was passed to the effect that the third meeting should take place in Leyden, the oldest University of the Netherlands, and that Dr. F. A. Jentink, Director of the Leyden Natural History Museum, should be its President. A circular informs us that the Netherlands' Zoological Society is making the necessary arrangements for this meeting, which is to be held on September 16-21, under the patronage of the Queen-Regent of the Netherlands. The Ministers of the Interior, of the Public Works, and of Commerce and Industry, will be Honorary Presidents of the Congress. A number of well-known zoologists have promised to attend the meeting, and to deliver addresses or read papers. The following scheme for the sectional meetings has been arranged :—(1) General zoology ; geographical distribution, including the fossil faunas ; the theory of evolution. (2) Classification of living and extinct vertebrates ; bionomy ; geographical distribution, including fossil vertebrates. (3) Comparative anatomy of living and extinct vertebrates ; embryology. (4) Classification of living and extinct invertebrate animals ; bionomy. (5) Entomology. (6) Comparative anatomy and embryology of invertebrate animals. Intending members may send the subscription (£1) to Dr. P. P. C. Hoek (Helder), the General Secretary, or to Dr. R. Horst (Leyden), Treasurer.

The summer meetings of the Institution of Naval Architects will be held in Paris on Tuesday, June 11, and during the remainder of the week. The Right Hon. Lord Brassey, K.C.B., President of the Institution, will occupy the chair. We are informed that the French Government is taking a warm interest in these meetings, and that, under the honorary presidency of the Minister of Marine, Vice-Admiral Besnard, and under the acting presidency of Vice-Admiral Charles Duperré, a strong and influential Reception Committee has been formed, representing the Ministry of Marine, the French Navy, the Municipality of Paris, the Chamber of Commerce of Paris, the Great French Industries and Steamship Owners, the Railroad Companies, the University of Paris, the Conservatoire des Arts et des Métiers, the French Institution of Civil Engineers, the Society for the Encouragement of National Industry, the French Institution of Naval Architects, and the Union of Yachts. This Committee has already taken active steps to draw up a programme of exceptional interest for the instruction and entertainment of the Institution. Papers have already been promised by M. Emil Bertin, Director of the French Government School of Naval Architecture, and M. V. Daymard. There will also be papers by Sir William White, Mr. B. Martell, Dr. Francis Elgar, Mr. Archibald Denny, and Mr. Mark Robinson.

During the Easter vacation the following naturalists have been at work in the Liverpool Marine Biological Station at Port Erin :—Dr. H. O. Forbes, Mr. F. G. Baily, Mr. P. M. C. Kermode, Dr. J. D. Gilchrist (Edinburgh University), Mr. A. O. Walker, Prof. Herdman, and Mr. J. C. Sumner (curator). Two steamer dredging expeditions have been carried out to the west and south of the Isle of Man. On these a small shank trawl was worked, in addition to the dredge, with considerable advantage—on one occasion, in fact, coming up so full that the net burst with the weight on leaving the water, and the contents were lost. A number of fine Echinoderms were obtained with the trawl, including *Luidea*, *Palmipes*, *Porania*, *Stichaster*, *Synapta*, and other Holothurians. Amongst the Crustacea were *Scalpellum*, *Munida bamffica*, *Xantho tuberculata*, *Ebalia tuberosa* and *E. tumefacta*, *Anapagurus hyndmanni*, *Galathea dispersa* with *Pleurocrypta dispersæ*, *Melphidipella macera*, and a number of the rare shrimp *Pontophilus spinosus*, Leach. Floating fish eggs (plaice and another species) were caught in the tow-nets in Port Erin Bay, both in March and April ; and *Aplysia*, *Doris*, *Sepiola*, and other Invertebrates have spawned in the tanks at the Biological Station. The Liverpool Committee is at present considering the possibility of a further extension of the Station in the form of a hatchery and a large tidal pond, such as was contemplated in Prof. Herdman's original scheme of the institution.

An Italian Seismological Society has recently been founded by Prof. Tacchini, the well-known Director of the Central Meteorological and Geodynamic Office at Rome. Its objects are to make known as soon as possible all the seismic and volcanic phenomena occurring either in Italy or in other countries, to publish short notes about them, descriptions of seismic apparatus, &c., and generally to promote the study of geodynamics. The subscription being moderate, and national and foreign members being admitted on nearly the same terms, the new society, it is to be hoped, may become practically a European one.

A useful innovation, that we hope is to be continued, has been started by the Geological Society of London, in the publication of a catalogue of geological literature added to the Society's library during the half-year ended December 1894. This is equivalent to a list of all important books and papers on geology published in that period. Every paper is catalogued separately, under the author's name, and there is a subject-index. The whole is a distinct improvement on the list hitherto published annually in the November *Quarterly Journal ;* and in spite of the improvements, this list for the half-year is less than half the bulk of the last annual one. The only important omission is that of maps. The work will be most useful to all geologists who wish to keep abreast of recently published works.

The science of oscillations has been enriched by some simple and instructive elementary experiments, due to Dr. H. J. Oosting, which are described in the *Zeitschrift für den Physikalischen Unterricht*. That the velocity of a pendulum is greatest when the bob reaches its mean position is shown by means of a pendulum with a mirror attached to it at its axis of suspension, the upper end of the pendulum-rod being attached to a stout wire bridge, the feet of which take the place of the knife edge. When a beam of light is reflected from this mirror, a line of light is formed upon the screen if the pendulum vibrates rapidly enough. The light from the lamp is made intermittent by a uniformly revolving disc provided with holes bored at equal intervals near the edge. A series of points are then produced on the screen, which are crowded together towards the ends, and further apart towards the middle of the line of light, the distance being proportioned to the velocity of the bob.

Another neat contrivance designed by the Dutch physicist is one for producing Lissajous' curves resulting from the combination of two vibrations at right angles to each other. The simplest form of vibrating mirrors consists of two small mirrors attached to wires stretched in a vertical and horizontal position respectively. The periods of vibration are adjusted by screws carrying nuts mounted behind the mirror at right angles to the wire. The vibration is made slower by screwing the nuts outwards ; or, if a pendulum is to be used, it is attached to the bottom of a U-shaped wire bent out and down at the upper ends, so as to oscillate about the ends of the wire. A horizontal circle is attached to the U at the centre of suspension, carrying a precisely similar suspension for a second and smaller pendulum, except that a horizontal mirror takes the place of the horizontal circle. The periods are adjusted by weights movable along the rods, and the resulting curves may be thrown upon the ceiling, or back upon a screen just in front of the lantern with a hole for letting the light through. In this case the beam must be twice reflected from a mirror at 45° to the horizon.

Within the last year or two, the number of methods for observing the characteristics of an alternating current which have been described is considerable. The latest step in this direction is due to M. J. Pionchon (*Comptes rendus*, April 22, 1895), who uses an optical method. The alternating current is passed through a coil, surrounding a tube filled with carbon bisulphide or a saturated solution of mercuric and potassium iodides. This tube is placed between the polariser and analyser of a half-shadow polarimeter. Under these circumstances the plane of polarisation of the light, after its passage through the tube, passes in succession through all the positions between two limits, one of which corresponds to the maximum current in one direction, and the other to the maximum current in the opposite direction.

If, as is the case in practice, the alternations are fairly rapid, the appearance presented is that during the passage of the current the two halves of the field appear equally bright when the analyser is adjusted in the zero position for no current passing. By adopting the stroboscopic method of observation, the author has, however, succeeded in making clear the different phases of illumination through which the field of view passes. By suitably adjusting the difference ($\epsilon$) between the period ($T'$) of the stroboscope and the period ($T$) of the current, it is possible to see the various phases of the phenomenon pass as slowly as is desirable, the period of the apparent change being to the period of the current in the ratio of $T'$ to $\epsilon$. Hence, by determining the time taken to go through a whole cycle of the apparent changes, the period of the current can be deduced. The maximum value of the current can also be determined. If we denote by $\mu$ the rotation of the plane of polarisation of the light corresponding to the maximum current, then, when the principal plane of the analyser is rotated through a less angle than $\mu$, the two halves of the field will appear equally bright twice during each cycle of the apparent changes. If the angle of rotation of the analyser is $\mu$, this equality will only occur once in a cycle, while if the rotation is greater than $\mu$, at no time will the two halves of the field of view appear equally bright. Thus it is quite easy to determine the position of the analyser corresponding to the maximum current. The method also admits of obtaining the current curve, by noting the times at which, when the angle of rotation of the analyser ($\alpha$) is less than $\mu$, the two halves of the field are equally bright. The current corresponding to the two times observed can be calculated from the value if $\alpha$, the known dimensions of the coil, and Verdet's constant for the liquid employed.

PROF. FRANK CLOWES' "Treatise on Practical Chemistry and Qualitative Analysis," adapted for use in the laboratories of colleges and schools, has reached a sixth edition. Messrs. J. and A. Churchill are the publishers of the book.

THE *Quarterly Journal* of the Geological Society, just issued (No. 202), contains, in addition to papers read at the meetings, the report of the proceedings of the annual meeting and the anniversary address of the president, Dr. Henry Woodward, on "Some Points in the Life-history of the Crustacea in Early Palæozoic Times."

THE very useful pamphlet entitled "Notes on Polarised Light," by Mr. A. E. Munby, which we favourably noticed when it appeared about a year ago, has been translated into Russian by Prof. Glinka, of St. Petersburg University. Students of mineralogy beginning work with the polariscope, will find the contents of the pamphlet of great assistance.

WE have received a report of the proceedings of the conference on inland navigation, held in Birmingham in February, by the Federated Institution of Mining Engineers. The report contains some useful information on the important subject of the inland navigation of Great Britain, and a number of valuable suggestions for improving the present inefficient state of our inland waterways.

MESSRS. DULAU AND CO. have prepared and published a useful catalogue of separate papers from the *Philosophical Transactions* of the Royal Society offered for sale by them. The papers are indexed according to the authors' names. Two other new catalogues which scientific bibliographers will find valuable are R. Friedländer and Son's "Bücher-verzeichniss" (No. 417), containing titles of entomological works, and a list of books issued by Mr. Bernard Quaritch, Piccadilly, S.W.

*Science Gossip* for May contains several articles of scientific interest. Dr. Dallinger has a note on *Melicerta ringens*, illustrated by drawings of this small though interesting denizen of our ponds. Messrs. Wanklyn and Cooper write on Argon. Mr. Thomas Leighton has an article on "Geology of the Isle of Wight"; and Dr. Guppy writes on "Stations of Plants and Buoyancy of Seeds." Mr. Rudolph Beer has an interesting illustrated article on "Leguminous Plants."

THE West Australian Year-Book for 1893-94, issued by the Registrar-General, contains tables showing the results of meteorological observations at the chief observing stations, together with some general remarks on the climate of the colony. The climate varies a good deal in the different parts; in the south and south-west it is excellent, being temperate and cool, with regular and sufficient rainfall. To the eastward the climate is dryer, but little accurate information is available in that direction.

THE Report of the Royal Zoological Society of Ireland for the year 1894, shows that the Society is in an exceedingly prosperous condition. Nine lion cubs were born during the year, four of which died, but the five others (all males) were disposed of as exchanges. There are still two lions and five lionesses in the gardens of the Society. The Council has decided to make a donation to the funds of the *Irish Naturalist*, a monthly journal which frequently contains valuable information on the natural history of Ireland.

WE have received No. 2 of the Official Guide to the Museums of Economic Botany at the Royal Gardens, Kew, comprising Monocotyledons and Cryptogams. Among the specimens and products belonging to Monocotyledons, by far the larger number are naturally derived from the great order of palms; though the origin is also illustrated of other very important products, such as vanilla, ginger, grains of paradise, arrowroot, the pine-apple, aloes, bananas, the yam, New Zealand hemp, dragon's-blood, and many others. The palms include nearly 100 distinct exhibits, and the grasses upwards of 60. Among Cryptogams, several officinal and other useful articles are obtained from the fibres; while the Algæ and Fungi also yield their quota. A very copious index adds greatly to the value of this publication.

A REPORT, lately issued, on the progress and development of the Manchester Museum, Owens College, during the past four years, shows that the museum is a great power for good. By means of short courses of popular lectures, and informal demonstrations and addresses, the collections have been rendered more interesting and intelligible to the public. Clubs, societies, and classes have paid frequent visits of inspection, and have had the contents of various sections of the museum explained to them by Prof. Boyd Dawkins, or by members of the museum staff. A number of additions have been made in the geological department, one of the most interesting accessions being a model of a glacier, made to scale by Prof. Heim. The zoological and botanical collections have also been benefited by additions, and the specimens in most of the sections have been reduced to law and order.

A RECENT redetermination of the atomic weight of strontium, by T. W. Richards, confirms the value 87·70 found by Pelouze in 1845. Pelouze employed the method founded on a comparison of anhydrous strontium chloride and silver. The present author finds (1) the ratio between very carefully purified anhydrous strontium bromide and silver in three sets of analyses carried out by different methods, and (2) the ratio $2AgBr : SrBr_2$ in two other series of experiments. Taking oxygen = 16·000, the values obtained for the atomic weight of strontium are respectively (1) 87·644; 87·663; 87·668, and (2) 87·660; 87·659. The mean value from these results may be taken as 87·66.

THE additions to the Zoological Society's Gardens during the past week include a Common Squirrel (*Sciurus vulgaris*), British, presented by Mrs. Herbert Morris; four Yellow-bellied Liothrix (*Liothrix lutens*) from China, presented by Mr. Albert Kettich; a Black-billed Sheathbill (*Chionis minor*), captured at sea, a Water Rail (*Rallus aquaticus*), British, presented by Mr. John Gunn; a Lineolated Parrakeet (*Bolborhynchus lineolatus*) from Mexico, presented by Mr. Edward Hawkins; a Puff Adder (*Vipera arietans*) from South Africa, presented by Mr. J. E. Matcham; a Lear's Macaw (*Ara leari*) from South America, four White-backed Pigeons (*Columba leuconota*) from the Himalayas, a Rock-hopper Penguin (*Eudyptes chrysocome*) from New Zealand, deposited; two Alpine Choughs (*Pyrrhocorax alpinus*), European, purchased; an English Wild Cow (*Bos taurus*, var.), born in the Gardens.

## OUR ASTRONOMICAL COLUMN.

Relative Densities of Terrestrial Planets.—Attention is drawn to an interesting relation between the diameters and densities of the terrestrial planets, by E. S. Wheeler (*Science*, April 19). The planets are plotted with their diameters in miles as abscissæ, and their densities (the earth being taken as unity) as ordinates, and it is then seen that the points located in this way lie approximately in a straight line. Such a line passes within the limits of the probable errors of all except Venus. If this relation should prove to represent a natural law, the mass of a planet or satellite could be determined from its diameter. Venus is the only one of the five planets (the moon being included) that is any more discrepant than might be expected from its probable error; to make it accordant, either its mass must be increased by one-tenth, or its diameter decreased by one-thirtieth. A sufficient increase in the mass of Venus is stated to be all that is necessary to explain the movement of the perihelion point of the orbit of Mercury; but some of the irregularities of Mercury may be accounted for by the small mass which it is now supposed to have, namely, one-thirtieth that of the earth. In plotting the planetary curve, the density of Mercury adopted, is that derived by Backlund from a discussion of the movements of Encke's comet.

The Orbit of Comet 1893 IV (Brooks).—An investigation of the path of this comet, by Signor Peyra, seems to suggest that it is one of a series travelling in the same elliptic orbit (*Ast. Nach.* No. 3281). This conclusion is based on the similarity of the orbit with those of comets 1864 I and 1822 I, the periods of the comets rendering actual identity impossible. The elements of the orbit are as follows:

T = 1893 Sept. 19·25954 Berlin M.T.

| | ° | ′ | ″ | |
|---|---|---|---|---|
| Longitude of perihelion | 162 | 22 | 19 | 1893 |
| ,, ,, node ... | 174 | 55 | 12 | |
| Inclination ... ... | 129 | 50 | 14 | |
| Eccentricity ... ... | 0·9964886 | | | |
| Log *q* ... ... ... | 9·909551 | | | |
| Period ... ... ... | 3516 years. | | | |

The Spectrum of Mars.—A very practical contribution to the recent discussion as to the spectroscopic indications of aqueous vapour in the atmosphere of Mars is afforded by the investigations of Mr. Jewell as to the amount of vapour necessary to produce effects which can be observed with instruments of specified power. (*Astrophysical Journal*, April.) Expressing the amount of vapour present in the air of Baltimore by the depth in inches of a layer of water, the observed monthly mean for January is 0·73, June 3·25, October 1·56, the maximum occurring in June. He concludes that "unless the amount of water in the atmosphere of Mars is greater than that in the earth's atmosphere in October at Baltimore, it is useless to look for the presence of water vapour in the spectrum of Mars, unless our instrumental means are much superior to any hitherto used for that purpose." Since instruments of greater dispersion are unsuitable, because of the lack of sufficient light, there seems but little chance of obtaining any very decisive direct evidence of the presence of water vapour in Mars. It will be remembered that Dr. Janssen and others satisfied themselves as to the indications of water vapour bands in the spectrum of Mars, whilst Prof. Campbell has more recently failed to detect them.

The chances of detecting the presence of oxygen, however, if present, do not seem so hopeless, as the B group is readily seen with small dispersion.

It is also suggested by Mr. Jewell that attempts should be made to observe the chlorophyll bands in the spectrum of the green areas of the planets, since one of the bands is quite strong in the vegetation spectrum.

The Astronomical Society of France.—During the eight years of its existence, this Society has attained a membership of nearly 1000. At the annual meeting held recently, Dr. Janssen was elected president, and M. Camille Flammarion general secretary for the current session. The progress of astronomy in 1894 formed the subject of an address by M. Tisserand, the Director of the Paris Observatory. Among other matters he referred to the reappearance of De Vico's comet (Nature, vol. li. p. 542), which he regarded as further evidence of the fact that, at certain epochs, comets are subject to increases of brightness which they are incapable of maintaining, the increased activity being probably due to internal disturbances, the nature of which are not yet understood. It will be remembered, however, that Mr. Lockyer explains these fluctuations in brilliancy by collisions with meteor-swarms lying in the track of the comet. Referring to minor planets, M. Tisserand believed it not improbable that those appearing as bright as 12th magnitude stars have an average diameter of about 130 kilometres; that is, about one-hundredth of the earth's diameter; at that rate, even a thousand of them would not have a total mass equal to a thousandth part that of the earth, assuming that their mean density is not greater than that of the earth. (*Bull. Mens. Soc. Ast. de France*, May.)

## THE ROYAL SOCIETY CONVERSAZIONE.

THE annual Royal Society conversazione, to which gentlemen only are invited, was held in the Society's rooms on Wednesday of last week.

Many branches of science were represented in the exhibits, either by apparatus or by results of research. An exhibit that attracted much attention was the electrical furnace as used for the melting of chromium, titanium, platinum, and other metals, with high melting-points, shown by Prof. Roberts-Austen, C.B. The furnace consisted of a fire-clay case lined with magnesia, and contained a magnesia crucible. The carbon poles were horizontal, the arc being deflected by means of a magnet on to the material to be heated. For purposes of exhibition, an image of the molten contents of the furnace was projected, by means of a lens and mirror, on to a screen; the current employed is usually about 60 or 70 amperes at 100 volts.

Some very valuable metals of the platinum group were exhibited by Messrs. Johnson, Matthey, and Co., among them being a platinum nugget, weighing 158 ozs.; palladium ingot, of 1000 ozs.; rhodium ingot, 72 ozs.; osmium, melted and sponge; ruthenium melted by the electric arc; and pure iridium rolled sheet.

A magnet, showing the effects of currents in iron on its magnetisation, was exhibited by Dr. Hopkinson. A large electromagnet had buried in its substance two coils of comparatively small dimensions, one around the centre of the magnet, the other half-way between the centre and the surface. These coils were connected to two galvanometers. On reversing the current round the magnet it was seen that a considerable time elapsed before either galvanometer showed any substantial current, and that the current in the central coil occurred much later than in that at a less depth in the mass of iron.

Prof. J. A. Fleming showed a synchronising alternating current motor and contact maker, for the delineation of the form of alternating current and electromotive force curves, and a form of resistance of small inductance for use with the apparatus.

An instrument for analysing primary and secondary volts and amperes simultaneously was exhibited by Prof. W. M. Hicks.

Mr. R. E. Crompton had on view electrically heated apparatus, showing the method of applying electricity for heating tools and appliances used in trade; also for domestic purposes. Wires of high resistance composed of nickel, steel, or other suitable alloys, were embedded in an insulating enamel, and by it attached to the various articles to be heated. By this means loss of heat was obviated. Connection was made with the circuit by means of safety connectors, in which the contacts were automatically protected. The perfect flexibility of the system was exemplified in the electric oven, which was heated on all sides top, and bottom, and the temperature of which could be regulated